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10/715,464	11/19/2003	Toshiyuki Takabayashi	04175.0052	3747

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EXAMINER
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HSIEH, SHIH WEN

ART UNIT	PAPER NUMBER
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2861

DATE MAILED: 10/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/715,464

Applicant(s)

TAKABAYASHI ET AL.

Examiner

Shih-wen Hsieh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. Examiner did not find 1449 for the IDS filed on June 10, 2005 and is unable to return the same back to the applicants along with this office action. Please provide one. However, all of the references in the IDS dated June 10, 2005 are considered by the Examiner.

### ***Claim Objections***

3. Claim 3 is objected to because of the following informalities:

Line 2, please change "the plurality of recording heads" into "a plurality of recording heads" to correct a minor lack of antecedent basis problem.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 12, 16 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Cleary et al. (US Pat. No. 6,457,823 B1)

In regard to:

Claim 1:

Cleary et al. teach:

An image recording device, comprising:

a recording head (28, fig. 2 or 40, fig. 4) having a nozzle to discharge an ultraviolet-ray curable ink which is cured as irradiated with ultraviolet rays, refer to the title and col. 1, lines 32-36; and

an ultraviolet-ray irradiation device (24, fig. 2 or 42, fig. 4) having an ultraviolet light source to generate ultraviolet rays to cure the ultraviolet-ray curable ink, the ultraviolet light source comprising a liquid emitting diode which generates the ultraviolet rays having an emission wavelength peak in a range between 305 and 375 nm, and a maximum illuminance in a range between 40 and 1000 mW/cm<sup>2</sup> on a recording medium surface, refer to col. 4, lines 4-9; and col. 4, line 60 to col. 5, line 16 (please note: the set energy taught by Cleary et al. is between 40 mj/cm<sup>2</sup> to 240 mj/cm<sup>2</sup>, which is within

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the range as recited in this claim. Also,  $\text{mj}/\text{cm}^2$  represents the unit of the dosage of the radiation energy, which can be the same as the unit of the intensity of the radiation energy, expressed in  $\text{mW}/\text{cm}^2$ , please refer to US 6,786,589 B2, col. 12, lines 62-63 and US 6,550,905 B1, col. 11, Table 1), refer to col. 6, lines 11-16 for LED and wavelength, the wavelength of 365 nm is within the recited range in this claim,

wherein an image (fig. 3) is formed by placing the ultraviolet-ray curable ink discharged from the nozzle on the recording medium and by irradiating the ink on the recording medium with ultraviolet rays by the ultraviolet-ray irradiation device to cure the ink, refer to col. 4, lines 52-66.

Claim 2:

Cleary et al. further teach:

wherein the recording head is a serial head system (refer to either fig. 2A or fig. 4A; this serial head is different from a line head, which is not moving during printing), and the ultraviolet-ray irradiation device (24, fig. 2 or 42, fig. 4) is disposed on at least one of front and rear sides of the recording head in a main scanning direction (this direction is indicated by b-b in fig. 2 or d-d in fig. 4).

Claim 12:

A method for recording an image on a recording medium comprising:

discharging an ultraviolet-ray curable ink, which is cured as irradiated with ultraviolet rays, from a recording head having a nozzle disposed therein to place the ink on the recording medium;

placing the ink discharged from the nozzle of the recording head on the recording medium; and

irradiating ultraviolet rays from an ultraviolet light source to the ink on the recording medium to form the image,

wherein an emission wavelength peak of the ultraviolet light source is in a range between 305 and 375 nm, and a maximum illuminance of the ultraviolet light source is in a range between 40 and 1000 mW/cm<sup>2</sup> on a surface of the recording medium to cure the ink.

Rejection:

This method claim corresponds to the apparatus claim 1 discussed above, and the steps in this method claim are deemed to be made inherent by the functions of the structure in the combination as discussed above for claim 1.

Claim 16:

wherein the light source comprises a light emitting diode.

Rejection:

This claim is rejected on the basis as set forth for claim 1 discussed above.

Claim 17:

An image recording device, comprising:

recording means having a nozzle to discharge an ultraviolet-ray curable ink which cured as irradiated with ultraviolet rays; and

ultraviolet-ray irradiating means having an ultraviolet light source to generate ultraviolet rays to cure the ultraviolet-ray curable ink, the ultraviolet light source

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comprising a light emitting diode which generates the ultraviolet rays having an emission wavelength peak in a range between 305 and 375 nm, and a maximum illuminance in a range between 40 and 1000 mW/cm<sup>2</sup> on a recording medium surface, wherein an image is formed by placing the ultraviolet-ray curable ink discharged from the nozzle on a recording medium and by irradiating the ink on the recording medium with ultraviolet rays by the ultraviolet-ray irradiating means to cure the ink.

Rejection:

The recitations in this claim are the same as those in claim 1, except means are used in this claim. This claim is rejected on the basis as set forth for claim 1 discussed above.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3 and 13 are rejected under 35 U.S.C. 103(a) as being obvious over Cleary et al. in view of Suzuki et al. (US Pat. No. 6,786,589 B2).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2). Suzuki et al. teach an ultraviolet radiation sources (5, fig. 2), which are arranged in between print heads (4, fig. 2).



In regard to:

Claim 3:

The device of Cleary et al. DIFFERS from claim 3 in that it does not teach:  
wherein the plurality of recording heads are arranged, and the ultraviolet-ray irradiation device is disposed between the respective recording heads.

Suzuki et al. teach in their fig. 2 an ultraviolet-ray irradiation devices (5), which are disposed in between each of the print heads (4), refer to col. 11, line 66 to col. 14, line 22.

Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the device of Cleary et al. to include the arrangement of the serial heads and the UV light sources as taught by Suzuki et al. for the purpose of controlling the time interval from the jetting of the ink onto the medium to the irradiation by the UV ray to become the same for all of the print heads so as to achieve an effective set of the ink on the medium.

Claim 13:

The device of Cleary et al. DIFFERS from claim 13 in that it does not teach:  
wherein the recording medium is irradiated with the ultraviolet rays by the ultraviolet-ray irradiation device within 0.001 to second after the placing of the ultraviolet-ray curable ink on the recording medium.

Suzuki et al. further teach the time duration for irradiate the ejected ink on the recording medium after its landing is about 0.005 sec. To 0.2 sec., refer to col. 13, lines 57-65 (please note: this range is within the range recited in this claim).

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Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the device of Cleary et al. to include the time duration as taught by Suzuki et al. for the purpose of obtaining a uniform and high quality image.

8. Claims 4-11 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cleary et al.

In regard to:

Claim 4:

The image recording device of claim 1, wherein the recording head is a line head system, and the ultraviolet-ray irradiation device is disposed on a rear side of the recording head in a conveying direction of the recording medium.

Rejection:

A line head is simply a head, which remains stationary during printing. Or, in a line head, a device for moving the carriage, which mounted with the heads, can be omitted. And in line head system, printing medium is moved. Per this discussion, Cleary et al.'s invention still can be read on this claim with only the type of head is changed. However, the curing of the ink and the images the head makes remains the same as before, hence, carries less patentable weight.

Claims 5 and 6:

The image recording device of claim 1, wherein total power consumption of the ultraviolet-ray irradiation device is less than 1 kw/h (claim 5); and

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The image recording device of claim 1, wherein the ultraviolet-ray curable ink has a viscosity of 7 to 50 mpa.s at 25<sup>0</sup> C (claim 6).

Rejection:

Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the device of select an UV device with a desired power consumption, and also select an ink with a suitable viscosity range, since it has been held that discovering an optimum power consumption value of a result variable, and where a general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges, involves only routine skill in the art, refer to MPEP 2144.05 II B and II A.

Claims 7-11:

The image recording device of claim 1, wherein the ultraviolet-ray curable ink contains a compound having at least one kind of oxetane ring as photopolymerizable monomer (claim 7); and

The image recording device of claim 1, wherein the ultraviolet-ray curable ink contains 30 to 95 wt% of a compound having at least one kind of oxetane ring, 5 to 70 wt% of a compound having least one kind of oxirane group, and 0 to 40 wt% of at least one kind of vinyl ether compound as photopolymerizable monomers (claim 8); and

The image recording device of claim 1, wherein the recording medium is made of a material which does not absorb the ultraviolet-ray curable ink (claim 9); and

The image recording device of claim 1, wherein the ultraviolet-ray curable ink contains a compound having at least one of acrylic monomer or methacrylic monomer as a photopolymerizable compound (claim 10); and

The image recording device of claim 1, wherein the ultraviolet-ray curable ink contains 1 to 40 wt% of water-soluble monomer (claim 11).

Rejection:

These claims above deal with the material/ingredients of the ink and the recording medium. Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to select the ingredients of the ink and the material of the recording medium as appropriate, since it has been held to be within the general skill of a worker in the art to select a known material for the ink and the recording medium on the basis of its suitability for the intended use, refer to MPEP 2144.07.

Claim 14:

The device of Cleary et al. DIFFERS from claim 14 in that it does not teach:  
wherein the amount of an ink droplet discharged from the nozzle is 1 to 15 pl.

Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to design a discharge method such as by selecting an appropriate drive waveform so as to discharge ink droplet in a certain amount, since it has been held that where the general conditions of a claim are disclosed in the prior art, such as discharging ink droplet toward a recording medium, discovering the

optimum or workable ranges involves only routine skill in the art, refer to MPEP 2144.05

II A.

Claim 15:

The device of Cleary et al. DIFFERS from claim 15 in that it does not teach:

wherein a total ink film thickness is 2 to 20 gm after the ultraviolet-ray curable ink placed on the recording medium is irradiated with the ultraviolet rays and is thereby cured.

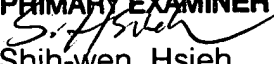
Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to set a range of ink film thickness on the recording medium for the UV ray to cure, since it has been held that where the general conditions of a claim are disclosed in the prior art, such as discharging ink droplet toward a recording medium and forming a film having a certain depth with a definite thickness, discovering the optimum or workable ranges involves only routine skill in the art, refer to MPEP 2144.05 II A.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shih-wen Hsieh whose telephone number is 571-272-2256. The examiner can normally be reached on 7:30AM -5:00PM.

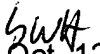
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Talbott can be reached on 571-272-1934. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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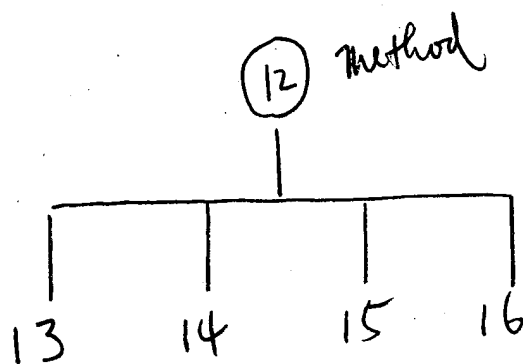
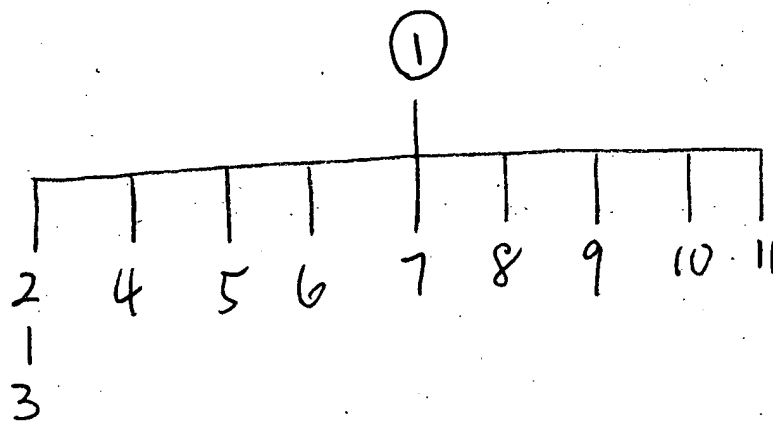
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**SHIH-WEN HSIEH**  
**PRIMARY EXAMINER**  
  
Shih-wen Hsieh  
Primary Examiner  
Art Unit 2861

SWH

  
Oct. 12, 2005

10/715,464



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